

BUILDERS HANDBOOK

OF NATCO HOLLOW TILE CONSTRUCTION

NATIONAL FIRE-PROOFING
• COMPANY •



PITTSBURGH PENNSYLVANIA



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INTRODUCTION



HIS volume is a complete and practical text book for the guidance of the builder in every detail of setting hollow tile.

The methods illustrated and described represent the practice most approved by fireproofing engineers and architects. They have been determined by wide practical experience in NATCO Hollow Tile construction particularly and may be accepted as standard in all hollow tile operations.

**NATIONAL
FIRE PROOFING COMPANY
PITTSBURGH, PA.**

SPECIFICATION SHEET FOR ERECTING NATCO HOLLOW TILE.

GENERAL:—Provide and erect all the Natco Hollow Tile exterior walls, interior bearing partitions, subdividing partitions, etc., as shown on plans. All material must be hard burned, true and regular in size and for exterior walls shall have all faces scored with special dove-tail scoring to offer a good surface for the stucco finish. Blocks cracked or broken on the outside shells will not be acceptable under this specification. In general the terra cotta blocks must be Natco Hollow Tile manufactured by the National Fire Proofing Co.

LAYING:—All blocks used in the exterior walls and interior bearing partitions, must be laid with the holes or cores vertically in the wall, in order to develop their full strength. Interior subdividing partitions may be laid on the side if desired.

MORTAR:—All mortar used for laying up the Terra Cotta Blocks shall consist of a standard Portland cement and clean sharp sand in the proportion of one part cement to three parts sand, well mixed to a smooth, moderately stiff mortar. Lime not to exceed 10 per cent of the mass by volume, will be allowed in the mortar.

FOUNDATION WALLS:—Where so indicated on plans, the foundation walls from top of footings to the underside of first floor beams shall be constructed of 9-hole 12x12x12 Natco Hollow Tile Blocks. Care should be taken at the corners to use 6x12x12 blocks to secure a running bond in the wall. Outside of walls from footing to a point above the ground shall be given a heavy coat of waterproof cement plaster or other approved damp-proofing.

Where columns or piers supporting heavy loads rest on the foundation wall the same will be filled with concrete from footing to top of wall to prevent the possibility of failure due to compression.

EXTERIOR WALLS AND BEARING PARTITIONS:—Exterior walls and partitions will be of thickness shown on the plans and must be in accordance with the foregoing conditions of quality, etc.

SUBDIVIDING PARTITIONS:—Subdividing partitions will be of hard burned Natco Terra Cotta Blocks (scored for plastering) with a percentage of full porous blocks or wood blocks for nailing purposes. All partitions must be started on the structural floor and wedged against the floor arch above.

JAMB BLOCKS:—Provide for all hung windows, special Jamb Blocks with rabbetted openings, to receive the window frame box. Fill well with mortar the space between the blocks and the frame box to within 1 inch of stop bead and caulk to stop bead with roofers cement to prevent the passage of air or moisture through same.

LINTELS:—Openings not exceeding 5'-0" in clear span may be spanned with special Natco Arch Lintel blocks or with ordinary stock tile reinforced with rods in lower cells and filled solid with concrete.

Openings over 5'-0" in clear span to be spanned with reinforced concrete girder, or with steel LS—size of structural or reinforcing steel variable with load and span.

SILLS:—Form all sills of Natco Hollow Tile sill block. Care must be taken to fill all joints so as to prevent moisture working through the same, wood sill of frame to be set in a heavy bed of roofers cement.

ARCH OPENINGS:—Build all arch openings shown on plans of two course rowlock common or hollow brick header arches, carefully laid on substantial centres. Arches will spring from the Terra Cotta Block and must be well bedded on same.

PORCH COLUMNS AND PIERS:—Construct the porch columns and piers, to sizes as shown, of Hollow Terra Cotta Blocks. Where column finish is round, build same of 3 inch round Hollow Terra Cotta column covering, filling the same with concrete where the second story walls are supported by them. Square columns shall be built of the proper size wall tile.

FLOOR BEAM BEARINGS: Provide and set Terra Cotta slabs 1 inch thick under all wood floor beams as bearing plates for same. These slabs will also be used for working up to levels and story heights when the full or half blocks do not work out correctly.

BEAM COURSES:—Wood floor beams to be framed into exterior walls as shown on detail, using in 8 inch walls 3x12x12 inch Natco Hollow Tile for facing ends of beams and 4 inch tile for filling between beams. In 10 inch walls use 5x12x12 inch tile for facing ends of beams and 4 inch tile for filling between beams. In 12 inch walls use 6x12x12 inch tile for facing ends of beams and 5 inch tile for filling between beams.

ROOF PLATES:—Embed at intervals of five feet in the wall under the roof plate, three quarter-inch bolts 30 inches long with nut and washers and projecting 6 inches above the top of wall, to allow of the plate being fastened down. Fill around bolts with cement grout before placing roof plate. One inch slabs should be placed on the tile course directly below bolts.

FLOOR CONSTRUCTION

GENERAL:—Floor construction will be of type known as the Combination Hollow Tile and concrete floor arch construction, consisting generally of 4 inch reinforced concrete beams spaced 16 inches on centers with Hollow Tile Blocks between, or the Johnson system laid on a 1 inch bed of 1 to 3 cement and sand with metal fabric bedded therein, all to have at least 4 inch bearing on walls.

CONCRETE:—All concrete used in floor construction shall consist of one part Portland cement, two parts clean sharp sand, and four parts broken stone or gravel of such size as will pass through a three-quarter inch ring. Concrete will be of wet mixture and must be well tamped and worked around reinforcing steel after pouring.

REINFORCING STEEL:—Steel rods for floor construction must be of such type as will offer a mechanical bond with the concrete. Corrugated, twisted or similar type will be acceptable. Steel must have an elastic limit of not less than one-half the tensile strength. Rods must be clean and free from rust scales before placing in position and must be placed not over 1 inch above bottom of floor.

TILE:—Depth of tile filler blocks and size of steel reinforcing rods will be regulated by span and load to be carried and will be of size indicated on the plans. All blocks must be wet before concrete is placed so as to insure a good bond with the concrete.

CENTERS:—Centers must be of such size to insure of their not deflecting under the weight of the wet concrete, and must be provided in such quantity as to insure of speedy work. Care must be taken not to remove the centers before the concrete is hard, and under long spans a center line of supports must be maintained for at least three weeks after the concrete has been poured. In cold weather the centers must be left in place until directed by the Architect to remove them.

SPECIFICATIONS FOR STUCCO ON HOLLOW TILE

The surface to which scratch coat is applied shall be free from all foreign material and shall be thoroughly wetted down before the first coat is applied; the first coat to be thoroughly scratched to insure proper bond for the coat to follow. The second coat shall be applied as soon as prior coat has sufficiently set to allow working upon same, and should be straightened with darby and straight edge, and floated with cork or wooden float to prevent waves showing on finished wall.

Should it be impossible to apply the second and latter coats as soon as the former coat has become thoroughly set, it is advisable to wet down the coat which has been applied as this gives a better bond between successive layers.

All finish coat work should as far as possible, be applied to the entire area of one side of structure at one operation. No finished coat work should be left in an unfinished condition. All work should be covered to corners.

Thickness of coats should average from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch. To get best results, three coats should be applied especially where a smooth or float finish is desired. Two coat work having a total thickness of not less than $\frac{3}{4}$ of an inch makes quite a satisfactory job for rough cast or pebble dash finish, but three coats makes a better construction.

MATERIALS

The materials composing the stucco shall consist of:—

(1) Portland cement which has been carefully tested and found to meet the requirements of the American Society for testing materials.

(2) Sand which is free from organic matter or loam and uniformly graded in size from coarse to fine.

(3) Hydrated lime, any good brand of prepared hydrated lime or well burned slaked lime putty will be accepted.

PROPORTIONS

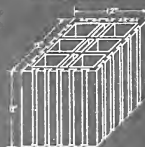
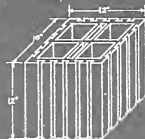
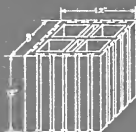
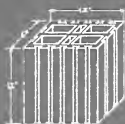
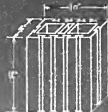
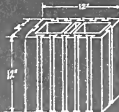
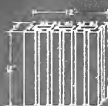
1st Coat—1 cement
1/10 lime
2 sand

2nd Coat—1 cement
1/10 lime
2 1/2 sand

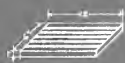
3rd Coat—1 cement
1/10 lime
3 sand

Finish coat of stucco to be waterproofed with an approved brand of Integral Waterproofing Compound or other approved Compound as per directions of manufacturers.

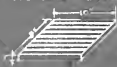
All joints between wood door and window frames at head, sides and sills must be calked tight with oakum or roofers cement before stucco is applied.



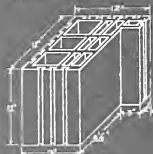
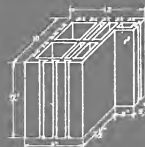
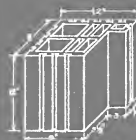
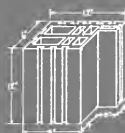
STANDARD WALL BLOCKS.



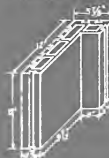
SOLID.



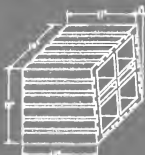
SLABS.



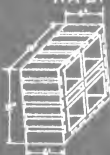
JAMB BLOCKS.



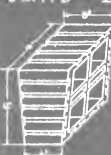
HALF JAMB BLOCKS.



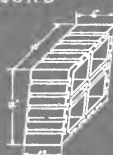
SKEW.



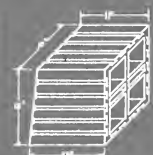
FILLER.



KEY.



FILLER.



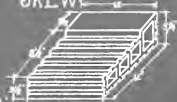
SKEW.



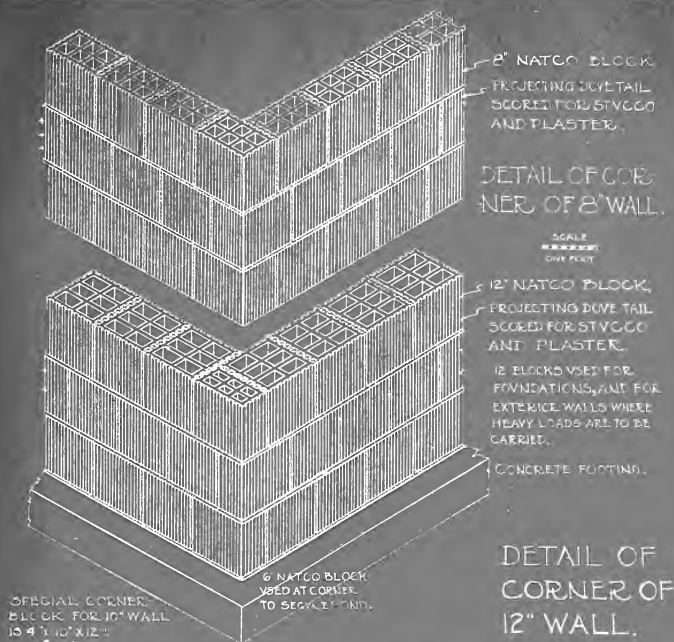
SILL.

ARCH BLOCKS.

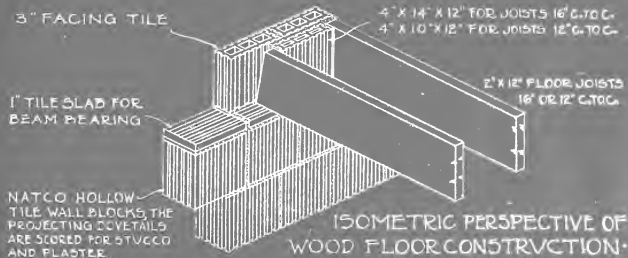
DETAIL OF SHAPES AND SIZES.



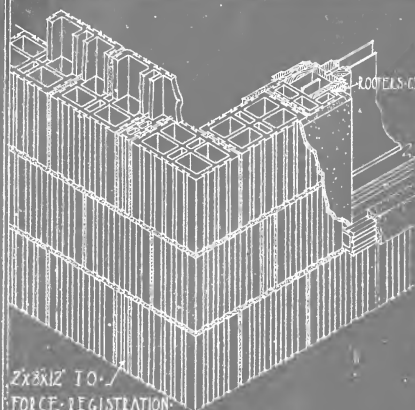
SILL.



Detail of Foundation and Exterior Wall Construction



Detail of Wood Joist Construction



2x8x12 TO-
FORCE-REGISTRATION

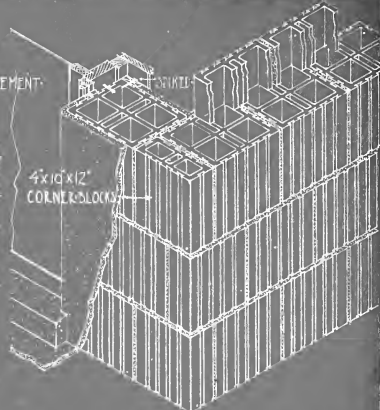
ISOMETRIC-VIEW-OF-8" TILE-WALL



ISOMETRIC-VIEW-OF-NEST-AS-
MANUFACTURED



NEST-OF-1" SLABS

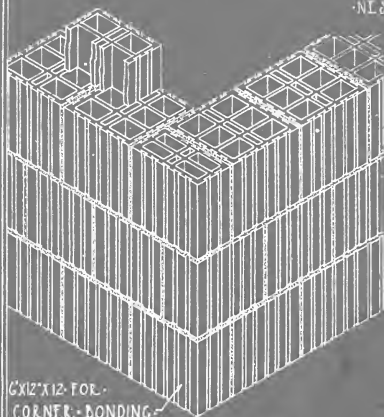


ISOMETRIC-VIEW-OF-10" TILE-WALL

TAP-ON-CORNERS-TO-
SEPARATE-SLABS

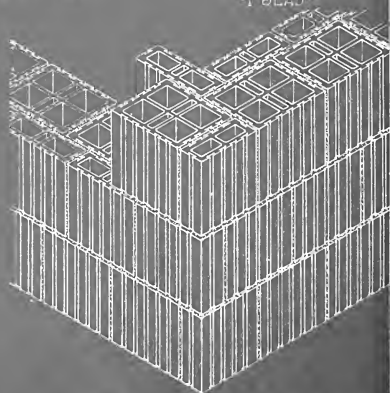


ISOMETRIC-VIEW-OF-SINGLE-
1" SLAB



6x12x12 FOR-
CORNER-BONDING

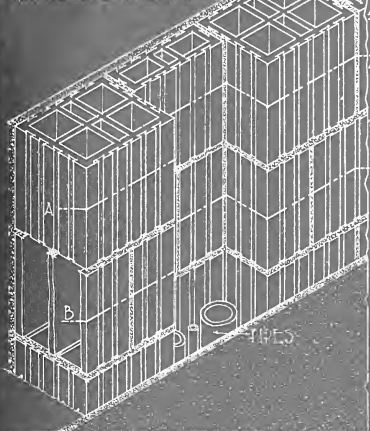
ISOMETRIC-VIEW-OF-12" TILE-WALL



ISOMETRIC-VIEW-OF-4" TILE-WALL

METHOD OF CHASING IN NATCO

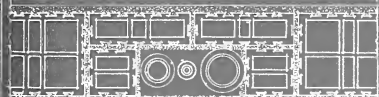
EXTERIOR STUCCO



ISOMETRIC VIEW SHOWING 6"x12" CHASE FOR PIPES IN 10" NATCO TILE WALL



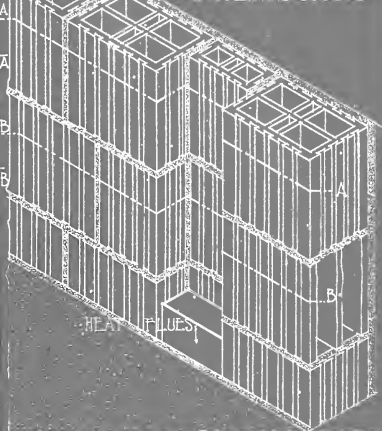
PIPE CHASE
PLAN THRU LINE A-A



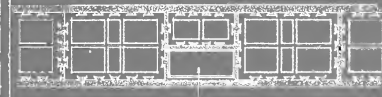
PLAN THRU LINE B-B

WALLS FOR HEAT PIPES ETC

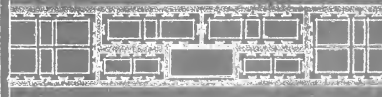
EXTERIOR STUCCO



ISOMETRIC VIEW SHOWING 4"x9" CHASE FOR PIPES IN 8" NATCO TILE WALL

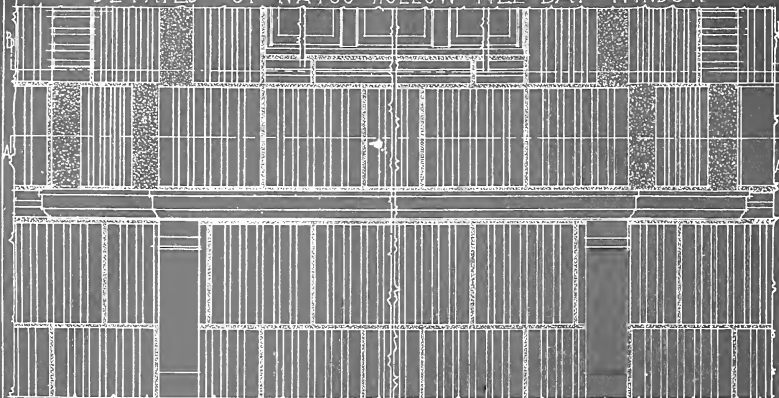


HEAT FLUE
PLAN THRU LINE A-A

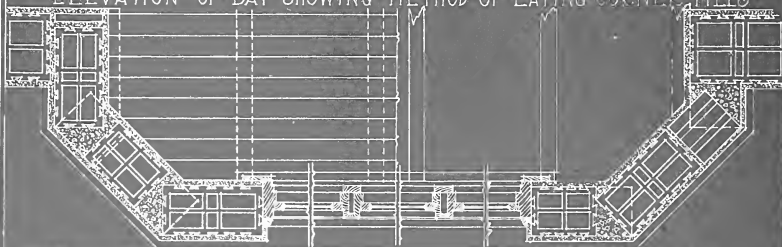


PLAN THRU LINE B-B

·DETAILS·OF·NATCO·HOLLOW·TILE·BAY·WINDOW·



·ELEVATION·OF·BAY·SHOWING·METHOD·OF·LAYING·CORNER·TILTS·



·PLAN·THRU·
·LINE·A·A·

·PLAN·THRU·
·LINE·B·B·

·FLOOR·LINE·

·REINFORCED·CONCRETE·SLAB·
·ORNAMENTAL·MOULD·RUN·ON·FACE·

·JOIST·

·REINFORCED·CONCRETE·BRACKETS·CAST·IN·PLACE·
·ORNAMENTAL·FACES·FORMED·IN·CASTING·

·SIDE·ELEVATION·OF·BAY·

·SECTION·OF·BAY·

DETAIL OF TYPICAL DOUBLE HUNG WINDOW CONSTRUCTION

SCALE 1/4" = 16" INCHES

NATCO ARCH LITEL WITH SKEW BACKS
NECESSARY FILLERS & KEY ADAPTED TO OPENING & NOT EXCEEDING
8" C INCLAL SPAN

KEY FILLED SKEW BACK

STUCCO COVERING

ELEVATION

COVERED WITH
LOOSE 1/2" CEMENT

PLAN SHOWING SPECIAL JAMB & LOCK

CONCRETE FILL

PLASTER

REINFORCING
BARS

STUCCO

LOOSE 1/2" CEMENT

STONE

LOOSE 1/2" CEMENT

SECTION OF HEAD OF REGULAR BLOCK

SECTION OF HEAD OF SPECIAL BLOCK

SECTION OF PATENTED TILE SILL

SECTION OF STONE SILL

METHOD OF FORMING PIERS BETWEEN DOUBLE HUNG WINDOWS.

STONE

LINTEL

NAIL IN FRAME

STONE SILL COURSE

10-IN.
HALF JAMB

10'X12'X12'

10-IN.
FULL JAMB

10-IN.
HALF JAMB

4'X12'

10-IN.
HALF JAMB

SILL COURSE

10-IN.
FULL JAMB

10'X12'X12'

10-IN.
HALF JAMB

10'X12'X12'

SILL COURSE

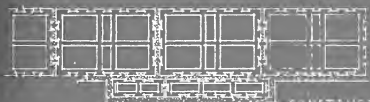
2'X8'X12' 2'X8'X12'



• ELEVATION OF PIER SIDE •



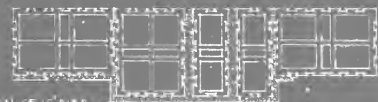
• ELEVATION OF WALL SIDE •



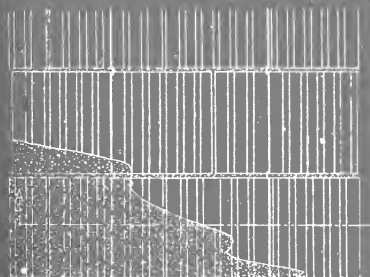
• PLAN AT COURSE A-A •

• CONSTRUCTION OF 15" PIER •

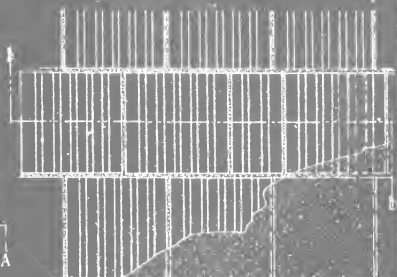
• IN AN 8" HOLLOW TILE WALL •



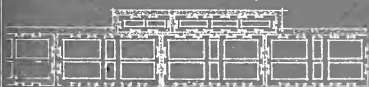
• PLAN AT COURSE B-B •



• ELEVATION OF PIER SIDE •



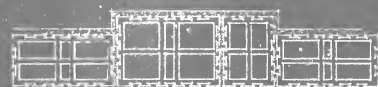
• ELEVATION OF WALL SIDE •



• PLAN AT COURSE A-A •

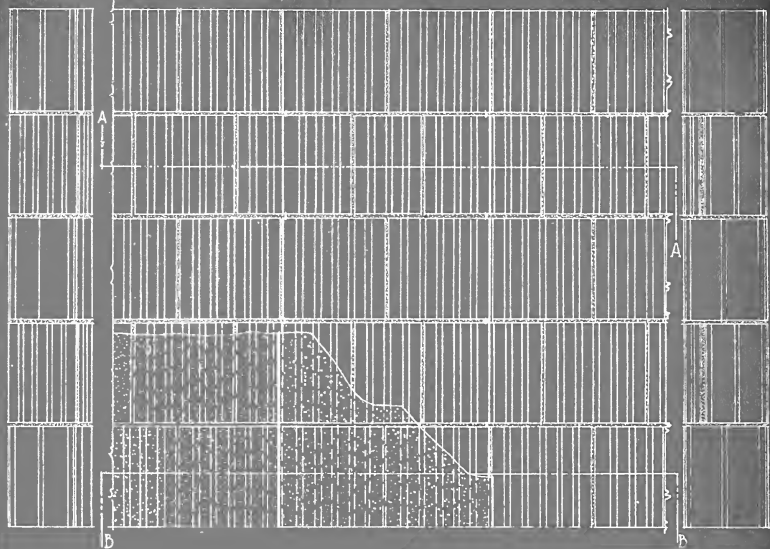
• CONSTRUCTION OF 18" PIER •

• IN AN 8" HOLLOW TILE WALL •



• PLAN AT COURSE B-B •

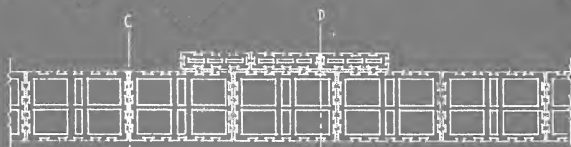
·24-INCH ·PIER-OR ·PILASTER ·IN ·AN ·8" NATCO ·WALL·



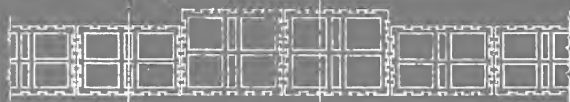
SECTION THRU WALL ·
·AT ·C ·C ·

·ELEVATION · OF · PILASTER ·

SECTION THRU PILASTER ·
·AT ·D ·D ·



· PLAN · AT · COURSE · A · A ·

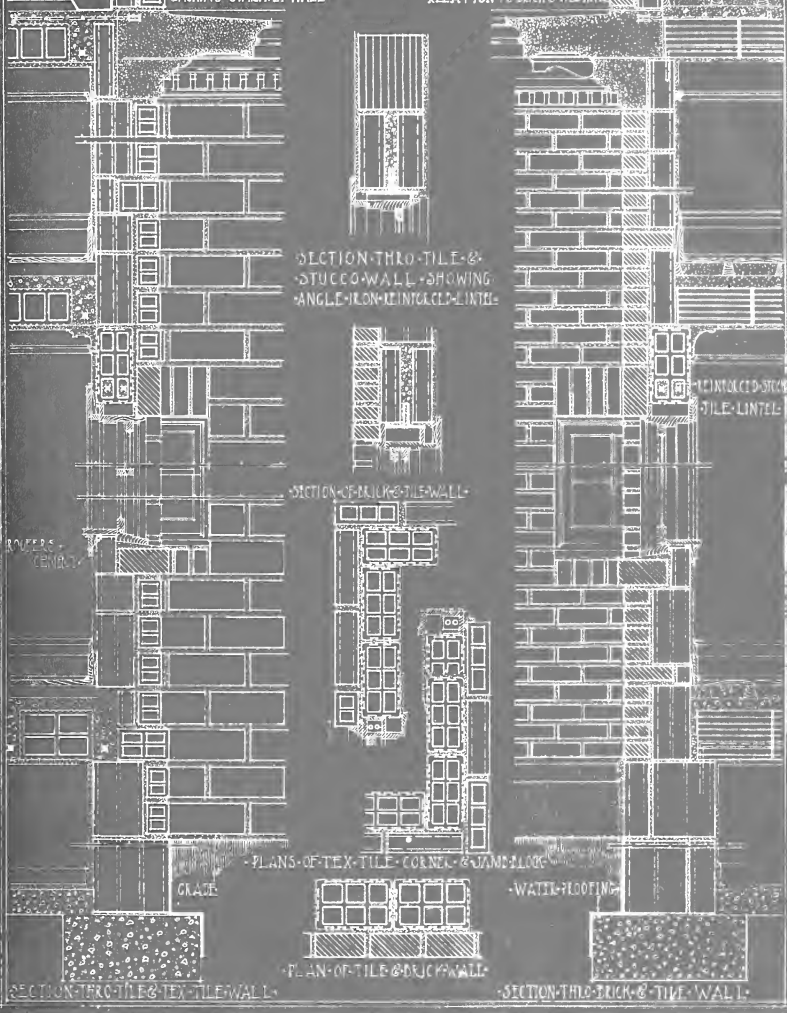


· PLAN · AT · COURSE · B · B ·

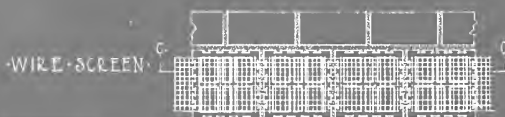
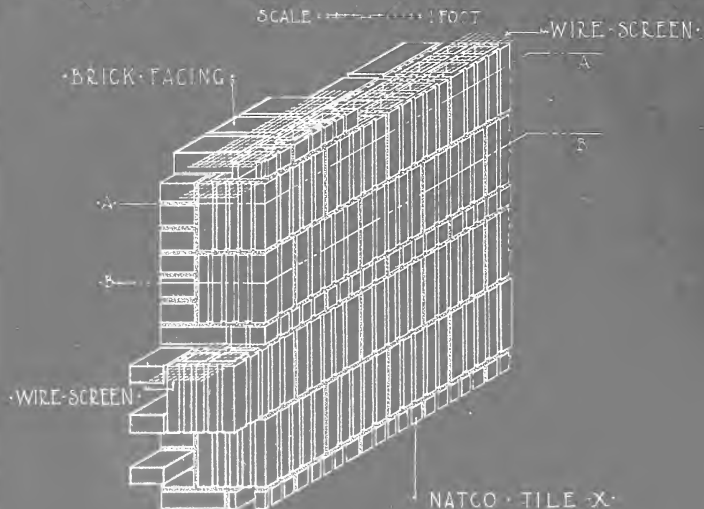
WATER PROOFING

4" HOLLOW-TILE FOR
BACKING 8" PALAPET WALL

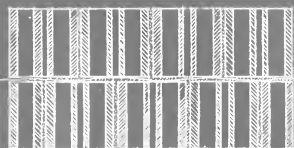
STONE CORNICE SHOWING
RELATION TO BRICK & TILE WALL



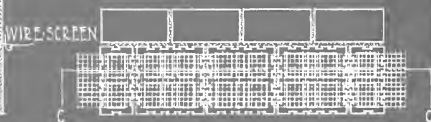
SECTION OF EXTERIOR WALL SHOWING NATCO X WITH
BRICK FACING BONDED WITH HEADERS EVERY SEVENTH COURSE



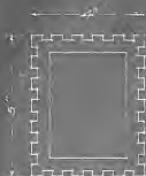
PLAN AT A-A



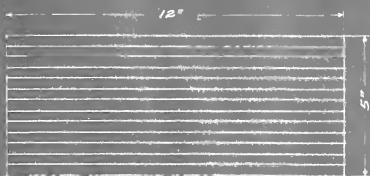
SECTION THRU C-C



PLAN AT B-B



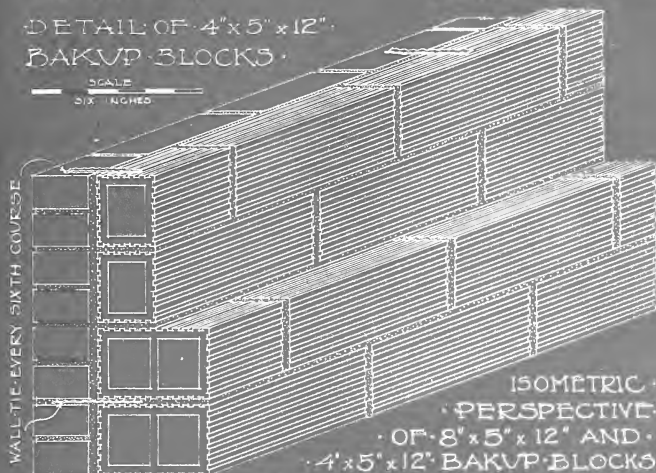
END VIEW



SIDE VIEW

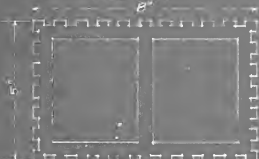
DETAIL OF 4" x 5" x 12"
BAKVP BLOCKS

SCALE
SIX INCHES



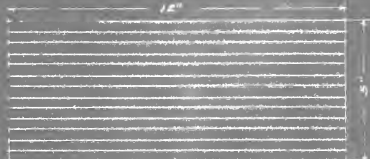
ISOMETRIC
PERSPECTIVE
OF 8" x 5" x 12" AND
4" x 5" x 12" BAKVP BLOCKS
LAID IN WALL WITH BRICK FACING

SCALE
ONE FOOT



END VIEW

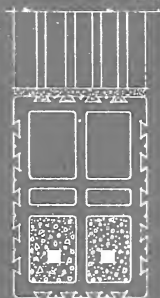
SCALE
SIX INCHES



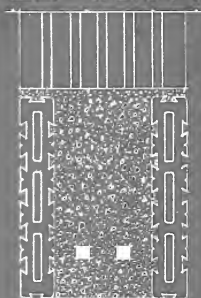
SIDE VIEW

DETAIL OF 8" x 5" x 12" BAKVP BLOCKS

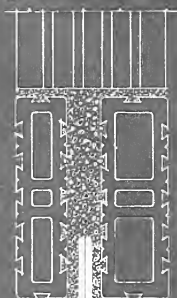
·LINTEL·SECTIONS·



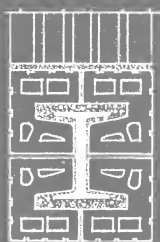
·STOCK·TILE
·REINFORCED·



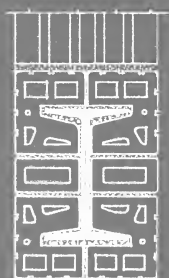
·CONCRETE·BEAM
·FACED·WITH·2·TILE·



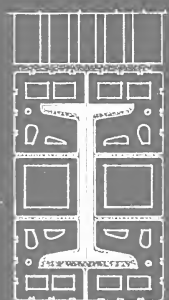
·STOCK·3/8 4·TILE·
·LINTEL·WITH·ANGLES·



·5"·LINTEL·COVERING·
·FOR·8·INCH·WALL·

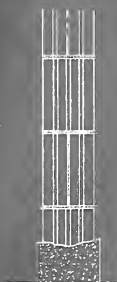


·8"·LINTEL·COVERING·
·FOR·8·INCH·WALL·

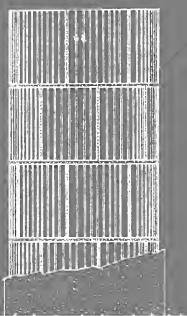


·9"·LINTEL·COVERING·
·FOR·8·INCH·WALL·

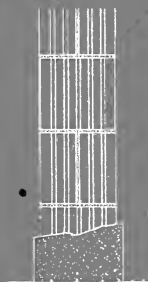
DETAIL OF HOLLOW TILE PIERS WITH STVCCO COVERING



ELEVATION



ELEVATION

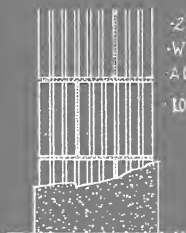


ELEVATION

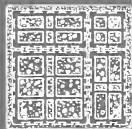


PLANS OF 10' TILE PIER - 4'x8' BLOCKS

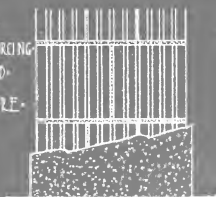
14' TILE PIER FILLED WITH CONCRETE
AND REINFORCING RODS AT CORNERS
6'x12' BLOCKS



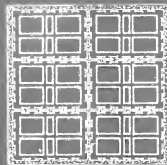
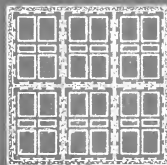
ELEVATION



20' ROUND COLUMN
WITH OR WITHOUT REINFORCING
ACCORDING TO LOAD
RODS WRAPPED WITH WIRE



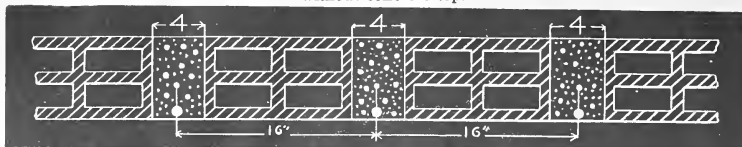
ELEVATION



PLANS OF 20' PIER REINFORCING AT CORNERS

PLANS OF 24' PIER

**SAFE LIVE LOADS in lbs. per sq. ft. for COMBINATION TILE FLOOR
without concrete top.**

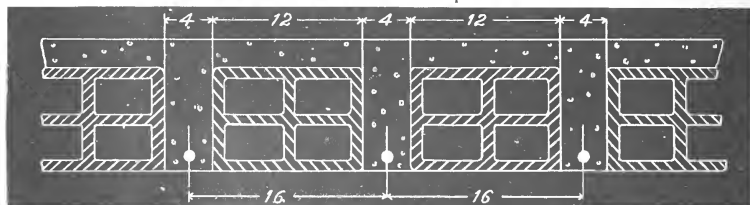


Composition of Concrete: 1 part Portland Cement—2 parts Sand—4 parts Stone or Gravel. Factor of Safety, 4.

SIZE OF TILE.

SPAN	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	15 in.
5'-0"	82	162	262	388	540	...	...	...	...
6'-0"	49	103	170	257	360	482	...	...	...
7'-0"	29	68	115	177	252	340	438	...	...
8'-0"	...	45	79	125	181	248	322	499	...
9'-0"	...	29	54	90	133	185	242	380	...
10'-0"	...	...	37	65	99	140	185	295	506
11'-0"	...	...	24	46	73	106	143	232	404
12'-0"	...	...	...	32	54	81	110	184	326
13'-0"	...	...	...	...	39	61	86	146	266
14'-0"	...	...	...	...	27	46	66	117	218
15'-0"	...	...	...	...	...	33	50	93	179
16'-0"	...	...	...	...	...	...	37	74	148
17'-0"	...	...	...	...	...	...	26	57	121
18'-0"	...	...	...	...	...	...	...	44	99
19'-0"	...	...	...	...	...	...	...	32	81
20'-0"	...	...	...	...	...	...	...	22	65
Reinforced Steel in Each Rib	$\frac{3}{8}$ " Sq.	$\frac{3}{8}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{3}{4}$ " Sq.	$\frac{3}{4}$ " Sq.
Weight of Floor per Sq. Ft.	26 lbs.	30 lbs.	38 lbs.	43 lbs.	48 lbs.	52 lbs.	58 lbs.	68 lbs.	82 lbs.

**SAFE LIVE LOADS in lbs. per sq. ft. for COMBINATION TILE FLOOR
with 2 in. concrete top.**



Composition of Concrete: 1 part Portland Cement—2 parts Sand—4 parts Stone or Gravel. Factor of Safety, 4.

SIZE OF TILE.

SPAN	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	15 in.
5'-0"	665	...	...	...	...	...	...	...	...
6'-0"	446	660	...	...	...	...	...	...	...
7'-0"	314	470	655	...	...	...	...	...	...
8'-0"	229	347	487	650	...	...	...	...	...
9'-0"	170	263	372	499	645	...	...	...	...
10'-0"	128	202	290	392	509	640	...	...	...
11'-0"	97	157	229	313	408	515	635	...	...
12'-0"	74	123	183	252	332	421	521	...	...
13'-0"	55	97	147	205	272	348	432	625	...
14'-0"	41	76	118	168	225	289	361	526	...
15'-0"	29	59	95	138	187	242	304	447	...
16'-0"	...	45	77	113	156	204	258	381	610
17'-0"	...	34	60	93	130	172	220	328	527
18'-0"	...	...	48	76	108	145	187	283	459
19'-0"	...	...	37	61	90	123	159	245	402
20'-0"	...	...	...	49	74	103	136	212	352
21'-0"	...	...	...	38	61	86	116	184	310
22'-0"	...	...	...	...	49	72	98	159	272
23'-0"	...	...	...	...	39	60	83	138	240
24'-0"	...	...	...	...	30	49	70	110	212
Reinforced Steel	$\frac{3}{4}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{3}{4}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{3}{8}$ " Sq.	$\frac{1}{2}$ " Sq.	$\frac{1}{2}$ " Sq.	$1 \frac{1}{8}$ " Sq.	$1 \frac{3}{8}$ " Sq.
Weight of Floor per Sq. Ft.	50 lbs.	55 lbs.	60 lbs.	65 lbs.	70 lbs.	75 lbs.	80 lbs.	90 lbs.	105 lbs.

Above tables are figured for continuous span with the following stresses, which are very conservative:

500 pounds per square inch in extreme fibre composition in concrete.

16,000 pounds per square inch, tension in steel, (to be medium open hearth).

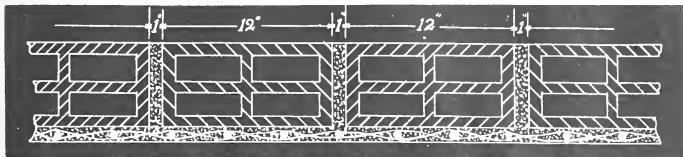
The end sheave and longitudinal sheave should be investigated, and sheave reinforcement provided when necessary.

NOTE—Designs made in accordance with the above table of loads will conform with the building laws of most large cities.

However a more economical design may often be obtained where building laws permit higher stresses.

Our Engineering Dept. is at the entire disposal of anyone desiring further information.

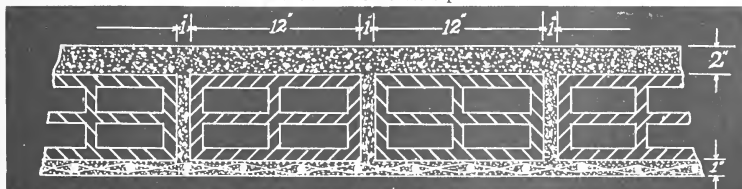
SAFE LIVE LOADS in lbs. per sq. ft. for JOHNSON SYSTEM FLOOR without concrete top.



Safe Live Load in Pounds per Square Foot—Factor of Safety, 4.

SPAN IN FEET	12-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 55 lbs.	10-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 52 lbs.	9-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 48 lbs.	8-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 45 lbs.	7-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 42 lbs.	6-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 37 lbs.	5-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 35 lbs.	4-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 29 lbs.	3-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 27 lbs.
8	...	...	488	422	324	263	171	125	79
9	...	507	383	333	254	206	132	113	61
10	558	407	308	264	202	163	105	76	48
11	458	337	253	219	165	133	86	62	39
12	386	282	210	179	137	111	71	51	32
13	326	234	178	152	116	93	59	43	...
14	278	202	152	129	98	78	49	36	...
15	241	175	130	111	84	68	42	30	...
16	210	151	113	97	73	58	36	...	...
17	189	133	99	75	63	51	31	...	...
18	164	117	87	72	56	45	...	...	...
19	146	103	77	66	49	39	...	...	...
20	129	92	68	58	43	34	...	...	...
21	117	83	61	51	38	30	...	...	...
22	104	75	54	46	34	...	...	...	...
23	95	67	49	41	30	...	...	...	...
24	86	61	44	37	...	...	...	...	...
25	77	55	39	...	...	...	...	...	...

SAFE LIVE LOADS in lbs. per sq. ft. for JOHNSON SYSTEM FLOOR with 2 in. concrete top.



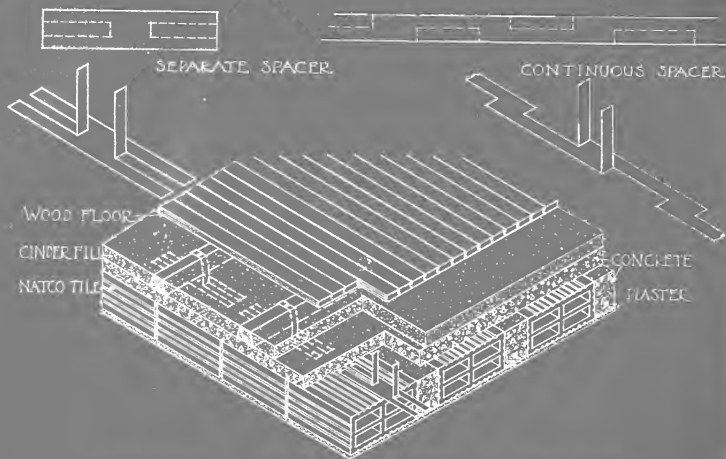
Safe Live Load in Pounds per Square Foot—Factor of Safety, 4.

SPAN IN FEET	12-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 79 lbs.	10-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 77 lbs.	9-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 72 lbs.	8-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 69 lbs.	7-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 56 lbs.	6-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 62 lbs.	5-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 59 lbs.	4-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 54 lbs.	3-in. Tile. ★-in. Dia. Rod. Weight of Floor per sq. ft., 51 lbs.
8	...	...	...	...	...	...	...	567	437
9	...	...	...	...	...	...	568	442	342
10	...	...	...	...	514	530	435	354	272
11	...	...	...	...	429	435	355	292	224
12	...	...	572	508	365	365	298	242	187
13	...	568	487	428	364	310	255	204	157
14	...	491	417	368	311	265	215	174	133
15	540	421	362	318	269	230	185	151	115
16	470	368	317	278	236	200	162	132	100
17	415	326	277	243	207	175	142	114	86
18	368	287	245	215	182	155	125	100	76
19	325	251	219	190	161	137	110	89	67
20	292	228	195	170	146	121	98	78	59
21	265	206	175	153	129	108	88	70	52
22	238	185	160	139	116	97	78	63	...
23	218	168	143	125	105	88	70	27	...
24	196	153	130	114	95	80	63	...	...
25	178	138	118	103	86	72	58	...	...

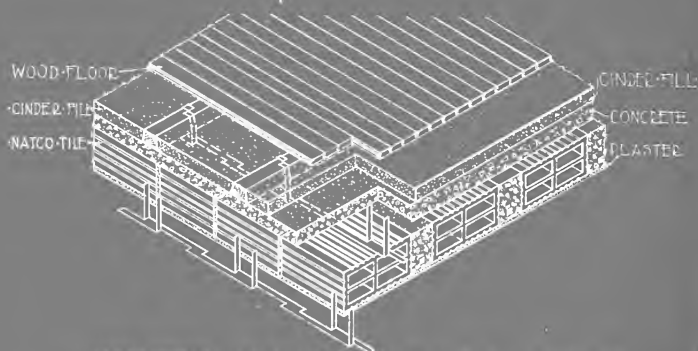
NOTE—Attention is called to the fact that this construction is reinforced in both directions. The reinforcing rods (shown in detail drawing page 56) take the direct strains. The transverse strains are taken by a woven metal fabric running lengthwise of the arch and through this fabric the rods are interwoven at intervals of four inches.

The above table is approximate and should be used for estimating only.

METHODS OF SECURING WOOD SLEEPERS TO NATCO FIREPROOF FLOORS



ISOMETRIC SHOWING SEPARATE SPACERS



ISOMETRIC SHOWING CONTINUOUS SPACERS

NATCO HOLLOW TILE
WALL. THE PROJ-
ECTING DOVETAILS
ARE SCORED
FOR STUCCO
AND PLASTER.

3" FACING
TILE.

1" TILE SLAB.

CONCRETE SLAB OVER
TILE WHEN NECESSARY
TO INCREASE STRENGTH
OF ARCH.

HOLLOW
TILE.

CONCRETE BEAMS
4" WIDE 16" ON CENTERS
REINFORCED WITH TWISTED
OR CORRUGATED STEEL BARS

ISOMETRIC PERSPECTIVE
OF COMBINATION FLOOR CON-
STRUCTION

SCALE
ONE FOOT

NATCO HOLLOW TILE
WALL. THE PROJ-
ECTING DOVETAILS
ARE SCORED
FOR STUCCO
AND PLASTER.

3" FACING
TILE

1" TILE SLAB

REINFORCED HOLLOW
TILE FLOOR.

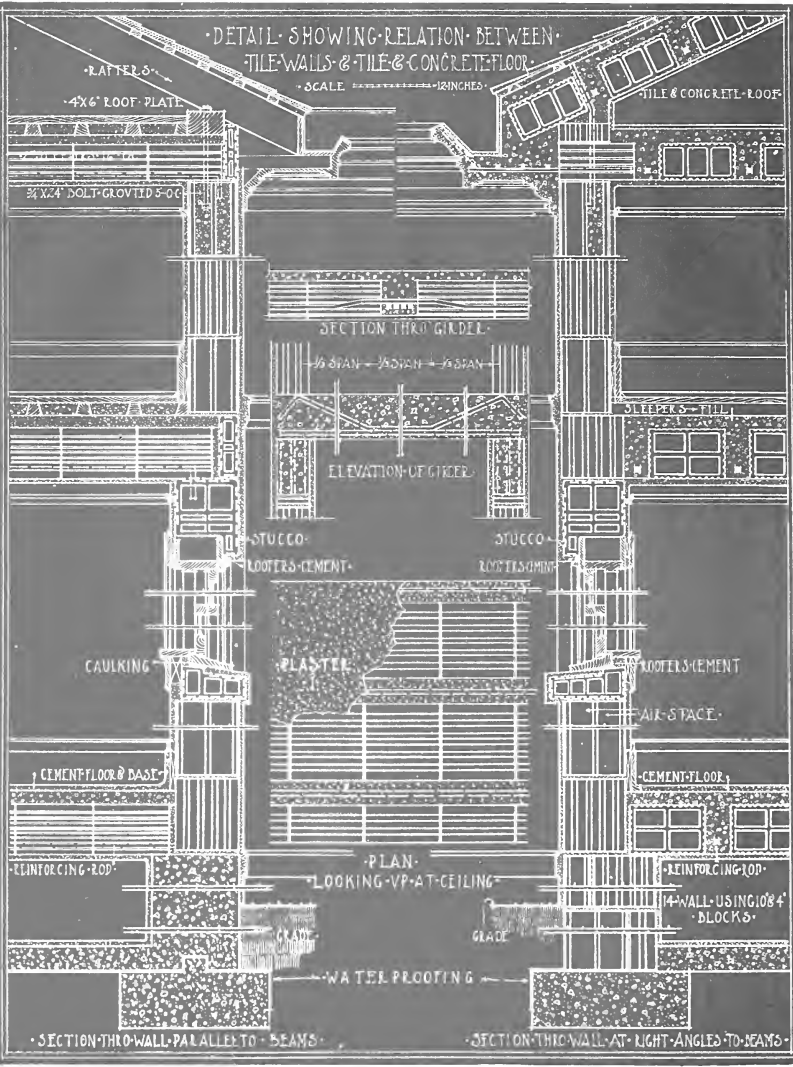
4" CEMENT
REINFORCED WITH
RODS AND METAL FABRIC.

ISOMETRIC PERSPECT-
IVE OF JOHNSON SYSTEM
OF FLOOR CONSTRUCTION

SCALE
ONE FOOT

DETAIL SHOWING RELATION BETWEEN
TILE WALLS & TILE & CONCRETE FLOOR

SCALE 1/4" = 12" INCHES



RAFTER 5"

4X6" ROOF PLATE

3/4" X 4" DOLT-GROTTED 5-00

SECTION THRU GIRDER

1/2 SPAN 1/2 SPAN 1/2 SPAN

ELEVATION OF GIRDER

STUCCO

LOOFERS-CEMENT

STUCCO

ROOFERS-CEMENT

CAULKING

PLASTER

ROOFERS-CEMENT

AIR-SPACE

CEMENT-FLOOR & BASE

CEMENT-FLOOR

REINFORCING-ROD

PLAN

LOOKING UP AT CEILING

REINFORCING-ROD

14" WALL USING 108 4" BLOCKS

GRADE

GRADE

WATER PROOFING

SECTION THRU WALL PARALLEL TO BEAMS

SECTION THRU WALL AT RIGHT ANGLES TO BEAMS

ISOMETRIC INTERIOR SHOWING METHOD OF USING
NATCO TILE FIRE PROOF FLOORS AND PARTITIONS

3" NATCO PARTITION BLOCKS

4" PARTITION LOCK

FLOOR TILE

PLASTER

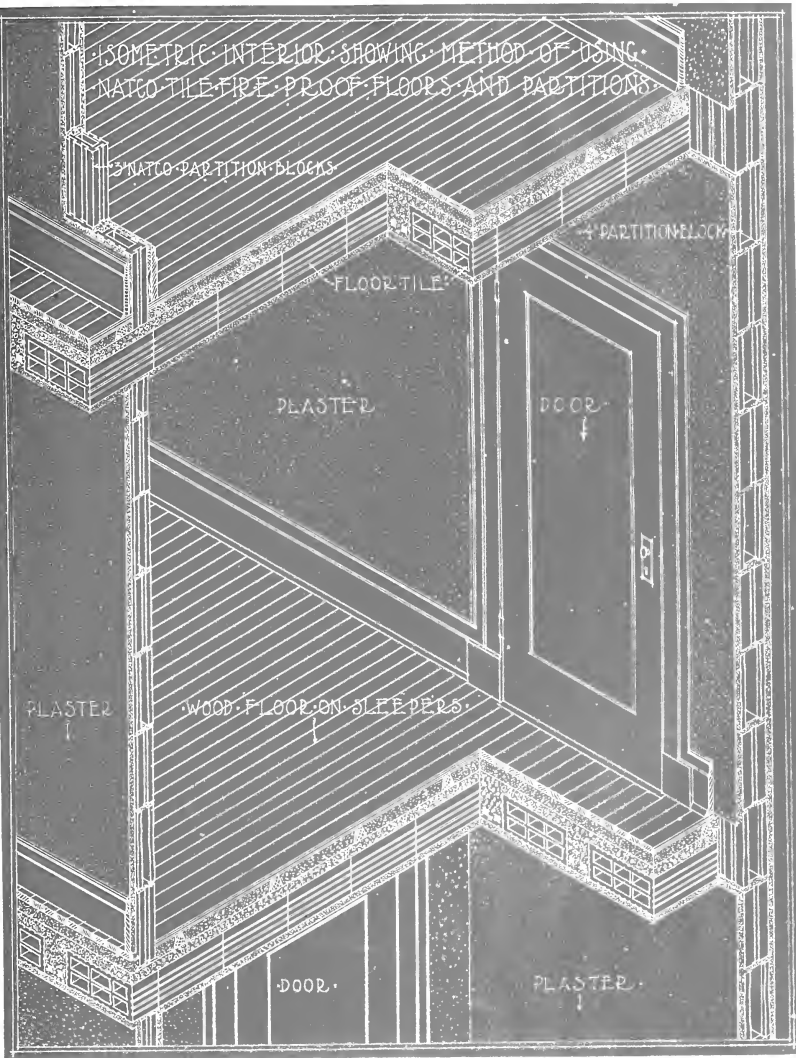
DOOR

PLASTER

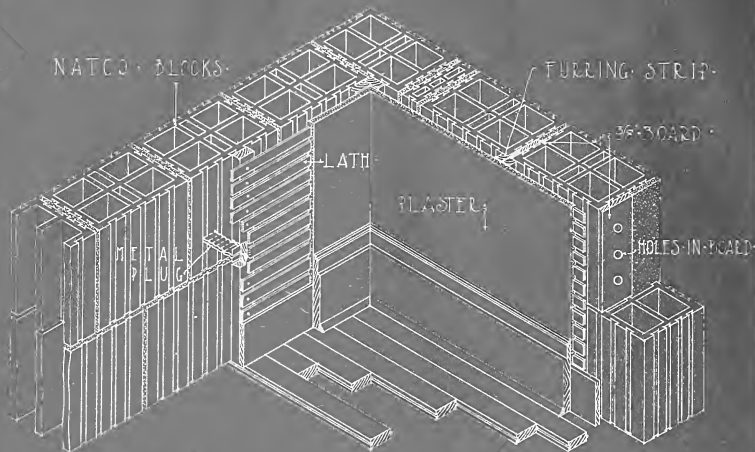
WOOD FLOOR ON SLEEPERS

DOOR

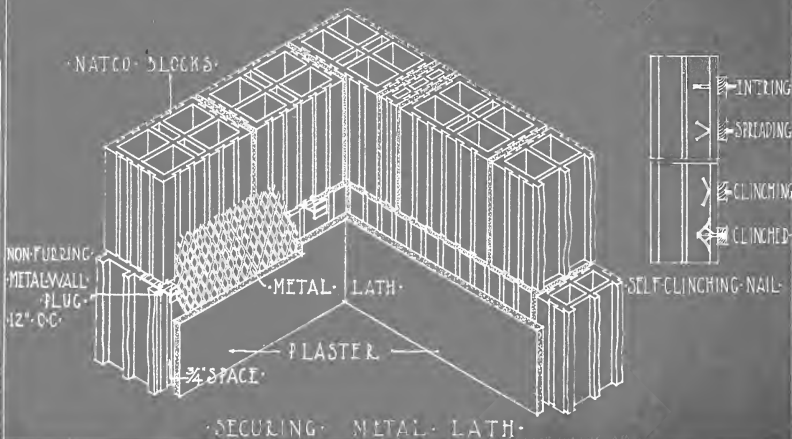
PLASTER



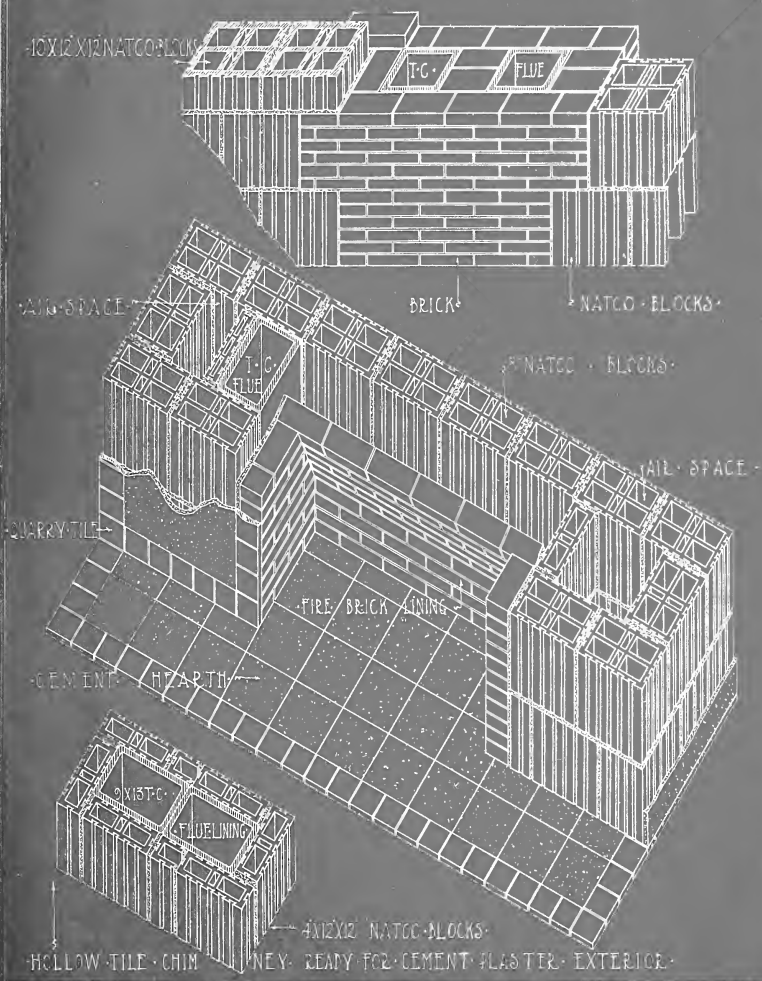
METHOD OF FASTENING TRIM AND FURRING TO NATCO WALLS



WOOD & METAL PLUGS IN NATCO TILE CONSTRUCTION



BRICK TIE-IN TILE OR CHIMNEY IN TILE WALLS

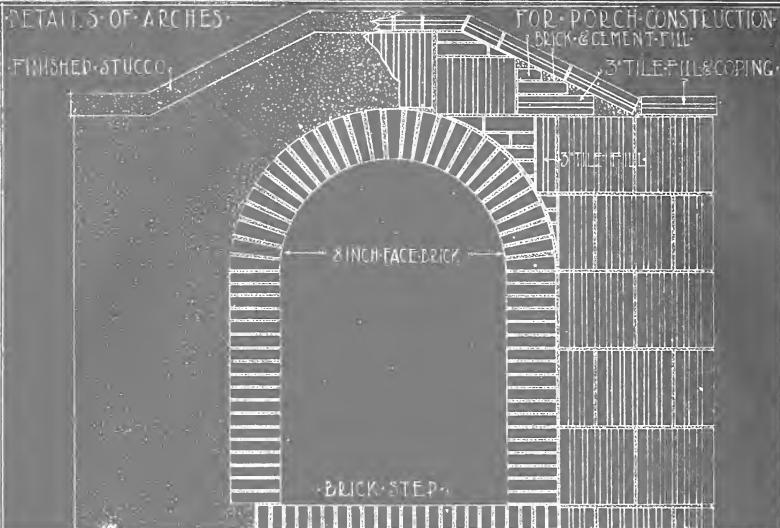


DETAILS OF ARCHES

FOR PORCH CONSTRUCTION
BRICK & CEMENT FILL

FINISHED STUCCO

3" TILE FILL & COPING



EXPOSED BRICK ARCH IN TILE WALL FOR PORCHES, ETC.

6" CUT TILE

2x8x8 NATCO TILE

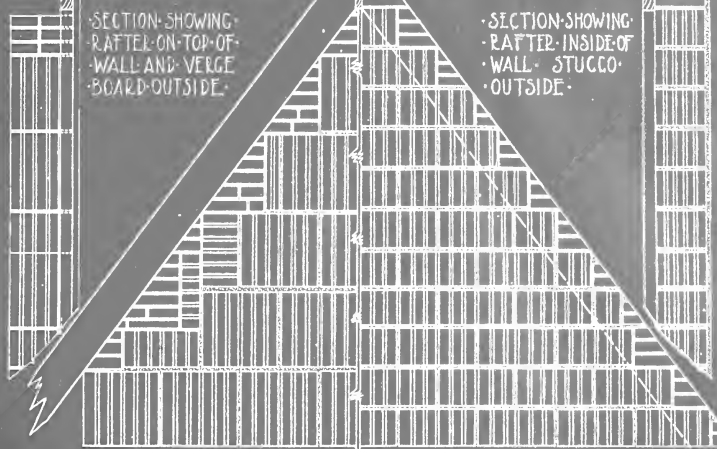
6x8x12 TILE

2" TILE SILL

2x8x12
W/50
2x8x8

SECTION THRU UNEXPOSED SEGMENTAL ARCH OF TILE IN TILE WALL FOR PORCH SECTION THRU ARCH

DETAILS OF CABLES AND BUTTRESSES

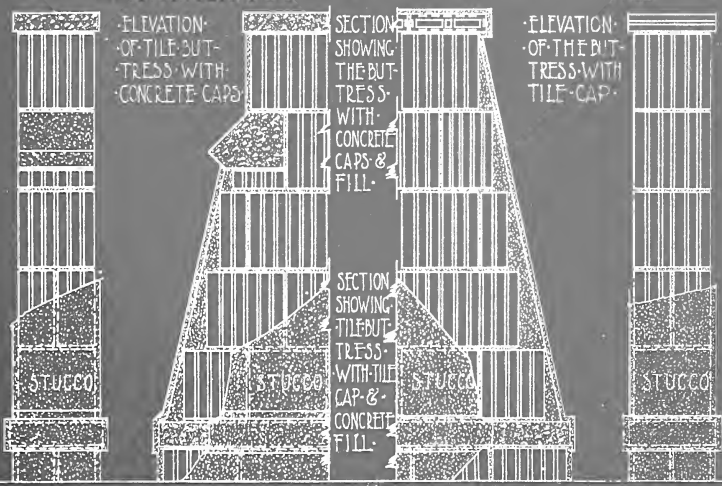


SECTION SHOWING
 RAFTER ON TOP OF
 WALL AND VERGE
 BOARD OUTSIDE.

SECTION SHOWING
 RAFTER INSIDE OF
 WALL STUCCO
 OUTSIDE.

METHOD OF BUILDING CABLE USING
 FULL STOCK BLOCKS & BRICK FILL

METHOD OF BUILDING CABLE USING
 HALF STOCK BLOCKS & BRICK FILL



ELEVATION
 OF TILE BUT-
 TRESS WITH
 CONCRETE CAPS

SECTION
 SHOWING
 THE BUT-
 TRESS
 WITH
 CONCRETE
 CAPS &
 FILL

ELEVATION
 OF THE BUT-
 TRESS WITH
 TILE CAP

SECTION
 SHOWING
 TILE BUT-
 TRESS
 WITH TILE
 CAP &
 CONCRETE
 FILL

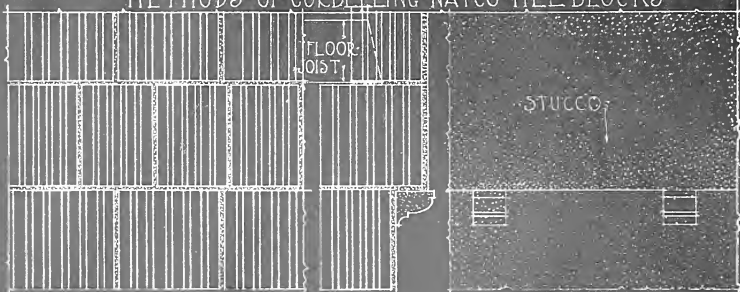
STUCCO

STUCCO

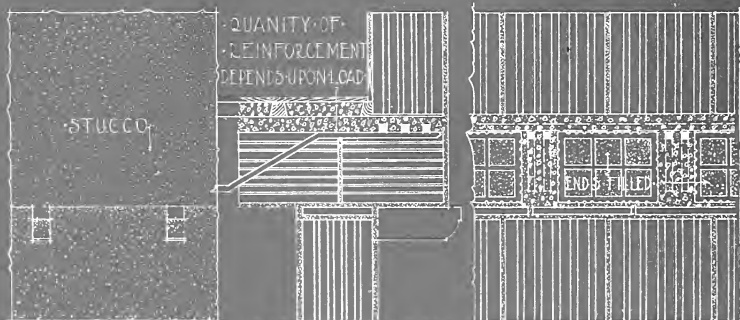
STUCCO

STUCCO

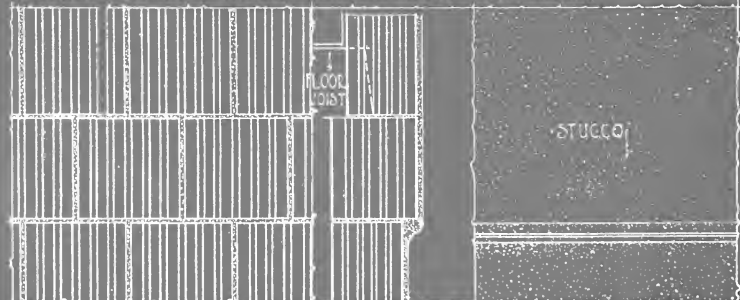
METHODS OF CORBELLING NATCO TILE BLOCKS



4" CORBEL IN AN 8" NATCO TILE WALL WITH WOOD FLOOR & LIGHT LOAD



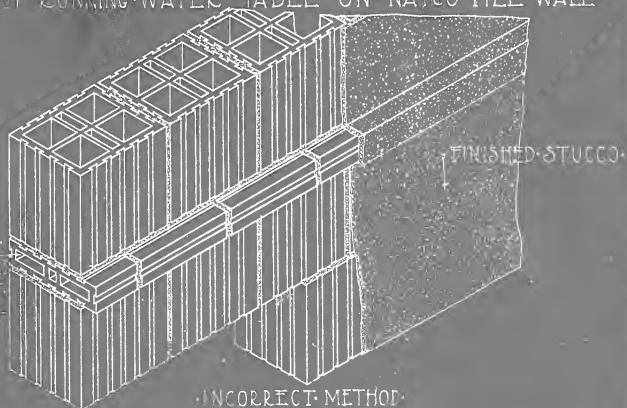
2" CORBEL IN AN 8" NATCO WALL WHERE FIRE-PROOF FLOORS ARE USED



2" CORBEL IN AN 8" NATCO TILE WALL USING 10X12X12 BLOCKS

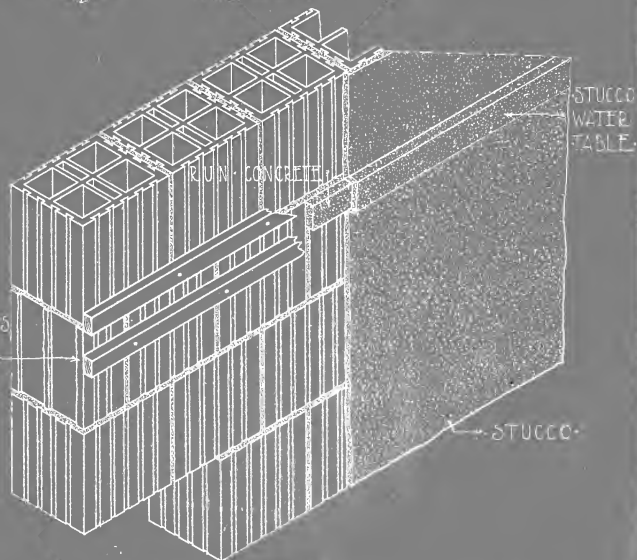
METHOD OF RUNNING WATER TABLE ON NATCO TILE WALL

WEAK POINT IN
WALL DETOUR
BLOW AIR FLAT
FLATTED COW-
LING DAMPNESS



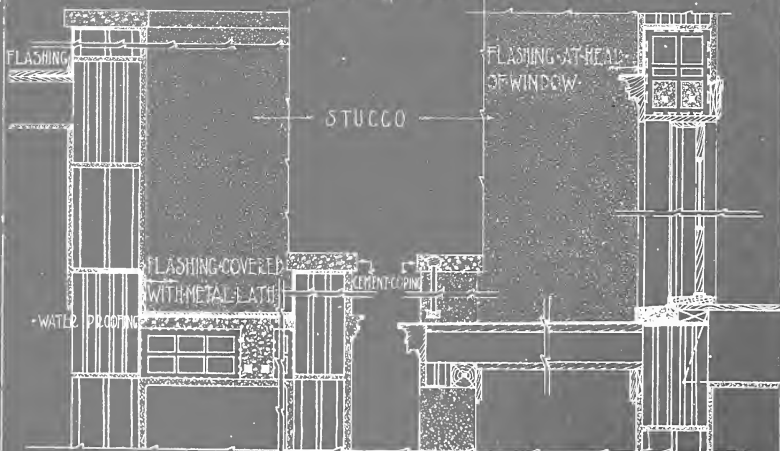
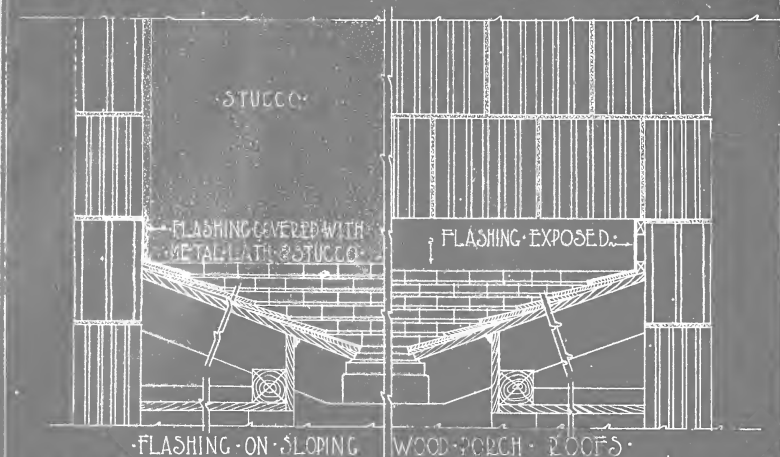
INCORRECT METHOD

FURRING STRIPS
FOR FORM



CORRECT METHOD

DETAILS SHOWING METHODS OF FLASHING NATCO TILE WALLS



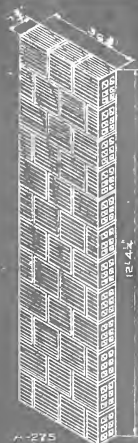
METHOD OF FLASHING FIREPROOF PORCH ROOF

TIN DECK ON FLAT WOOD ROOF



END
CONSTRUCTION

A-274



SIDE
CONSTRUCTION

A-275

A-274
OBSERVED AND CALCULATED RESULTS

OBSERVED AND CALCULATED RESULTS							
TIME	GRADE READING IN TONS 2000 LBS	AREA IN COMPRESSION 60 SQ. INCHES		HORIZONTAL DEFLECTION AT CENTER OF SECTION IN INCHES	COMPRESSION OF SECTION IN INCHES	REMARKS	
		ACTUAL LOCATION SECTION LBS	ACTUAL LBS PER SQ. INCH NET AREA LBS PER SQ. INCH IN COMPRESSED PL			BUILT APRIL 9, 1912 TESTED MAY 7, 1912 AGE 20 DAYS	
PM	2	0	0	0	0		
245	3	6000	100.00	25	100	0.52	
251	5	6000	100.00	75	200	0.74	
254	10	6000	100.00	150	400	0.97	
257	15	6000	100.00	225	600	0.97	
301	20	6000	100.00	300	800	0.97	
305	25	6000	100.00	375	1000	0.97	
307	30	6000	100.00	450	1200	0.97	
309	35	6000	100.00	525	1400	0.97	
311	40	6000	100.00	600	1600	0.97	FAINT SCRIBES
313	45	6000	100.00	675	1800	0.97	
315	50	6000	100.00	750	2000	0.97	FAINT SCRIBES
317	55	6000	100.00	825	2200	0.97	
319	60	6000	100.00	900	2400	0.97	
321	65	6000	100.00	975	2600	0.97	
323	70	6000	100.00	1050	2800	0.97	
325	75	6000	100.00	1125	3000	0.97	
327	80	6000	100.00	1200	3200	0.97	
329	85	6000	100.00	1275	3400	0.97	
331	90	6000	100.00	1350	3600	0.97	
333	95	6000	100.00	1425	3800	0.97	
335	100	6000	100.00	1500	4000	0.97	
337	105	6000	100.00	1575	4200	0.97	
339	110	6000	100.00	1650	4400	0.97	
341	115	6000	100.00	1725	4600	0.97	
343	120	6000	100.00	1800	4800	0.97	
345	125	6000	100.00	1875	5000	0.97	
347	130	6000	100.00	1950	5200	0.97	
349	135	6000	100.00	2025	5400	0.97	
351	140	6000	100.00	2100	5600	0.97	
353	145	6000	100.00	2175	5800	0.97	
355	150	6000	100.00	2250	6000	0.97	
357	155	6000	100.00	2325	6200	0.97	
359	160	6000	100.00	2400	6400	0.97	
361	165	6000	100.00	2475	6600	0.97	
363	170	6000	100.00	2550	6800	0.97	
365	175	6000	100.00	2625	7000	0.97	
367	180	6000	100.00	2700	7200	0.97	
369	185	6000	100.00	2775	7400	0.97	
371	190	6000	100.00	2850	7600	0.97	
373	195	6000	100.00	2925	7800	0.97	
375	200	6000	100.00	3000	8000	0.97	
377	205	6000	100.00	3075	8200	0.97	
379	210	6000	100.00	3150	8400	0.97	
381	215	6000	100.00	3225	8600	0.97	
383	220	6000	100.00	3300	8800	0.97	
385	225	6000	100.00	3375	9000	0.97	
387	230	6000	100.00	3450	9200	0.97	
389	235	6000	100.00	3525	9400	0.97	
391	240	6000	100.00	3600	9600	0.97	
393	245	6000	100.00	3675	9800	0.97	
395	250	6000	100.00	3750	10000	0.97	
397	255	6000	100.00	3825	10200	0.97	
399	260	6000	100.00	3900	10400	0.97	
401	265	6000	100.00	3975	10600	0.97	
403	270	6000	100.00	4050	10800	0.97	
405	275	6000	100.00	4125	11000	0.97	
407	280	6000	100.00	4200	11200	0.97	
409	285	6000	100.00	4275	11400	0.97	
411	290	6000	100.00	4350	11600	0.97	
413	295	6000	100.00	4425	11800	0.97	
415	300	6000	100.00	4500	12000	0.97	
417	305	6000	100.00	4575	12200	0.97	
419	310	6000	100.00	4650	12400	0.97	
421	315	6000	100.00	4725	12600	0.97	
423	320	6000	100.00	4800	12800	0.97	
425	325	6000	100.00	4875	13000	0.97	
427	330	6000	100.00	4950	13200	0.97	
429	335	6000	100.00	5025	13400	0.97	
431	340	6000	100.00	5100	13600	0.97	
433	345	6000	100.00	5175	13800	0.97	
435	350	6000	100.00	5250	14000	0.97	
437	355	6000	100.00	5325	14200	0.97	
439	360	6000	100.00	5400	14400	0.97	
441	365	6000	100.00	5475	14600	0.97	
443	370	6000	100.00	5550	14800	0.97	
445	375	6000	100.00	5625	15000	0.97	
447	380	6000	100.00	5700	15200	0.97	
449	385	6000	100.00	5775	15400	0.97	
451	390	6000	100.00	5850	15600	0.97	
453	395	6000	100.00	5925	15800	0.97	
455	400	6000	100.00	6000	16000	0.97	
457	405	6000	100.00	6075	16200	0.97	
459	410	6000	100.00	6150	16400	0.97	
461	415	6000	100.00	6225	16600	0.97	
463	420	6000	100.00	6300	16800	0.97	
465	425	6000	100.00	6375	17000	0.97	
467	430	6000	100.00	6450	17200	0.97	
469	435	6000	100.00	6525	17400	0.97	
471	440	6000	100.00	6600	17600	0.97	
473	445	6000	100.00	6675	17800	0.97	
475	450	6000	100.00	6750	18000	0.97	
477	455	6000	100.00	6825	18200	0.97	
479	460	6000	100.00	6900	18400	0.97	
481	465	6000	100.00	6975	18600	0.97	
483	470	6000	100.00	7050	18800	0.97	
485	475	6000	100.00	7125	19000	0.97	
487	480	6000	100.00	7200	19200	0.97	
489	485	6000	100.00	7275	19400	0.97	
491	490	6000	100.00	7350	19600	0.97	
493	495	6000	100.00	7425	19800	0.97	
495	500	6000	100.00	7500	20000	0.97	
497	505	6000	100.00	7575	20200	0.97	
499	510	6000	100.00	7650	20400	0.97	
501	515	6000	100.00	7725	20600	0.97	
503	520	6000	100.00	7800	20800	0.97	
505	525	6000	100.00	7875	21000	0.97	
507	530	6000	100.00	7950	21200	0.97	
509	535	6000	100.00	8025	21400	0.97	
511	540	6000	100.00	8100	21600	0.97	
513	545	6000	100.00	8175	21800	0.97	
515	550	6000	100.00	8250	22000	0.97	
517	555	6000	100.00	8325	22200	0.97	
519	560	6000	100.00	8400	22400	0.97	
521	565	6000	100.00	8475	22600	0.97	
523	570	6000	100.00	8550	22800	0.97	
525	575	6000	100.00	8625	23000	0.97	
527	580	6000	100.00	8700	23200	0.97	
529	585	6000	100.00	8775	23400	0.97	
531	590	6000	100.00	8850	23600	0.97	
533	595	6000	100.00	8925	23800	0.97	
535	600	6000	100.00	9000	24000	0.97	
537	605	6000	100.00	9075	24200	0.97	
539	610	6000	100.00	9150	24400	0.97	
541	615	6000	100.00	9225	24600	0.97	
543	620	6000	100.00	9300	24800	0.97	
545	625	6000	100.00	9375	25000	0.97	
547	630	6000	100.00	9450	25200	0.97	
549	635	6000	100.00	9525	25400	0.97	
551	640	6000	100.00	9600	25600	0.97	
553	645	6000	100.00	9675	25800	0.97	
555	650	6000	100.00	9750	26000	0.97	
557	655	6000	100.00	9825	26200	0.97	
559	660	6000	100.00	9900	26400	0.97	
561	665	6000	100.00	9975	26600	0.97	
563	670	6000	100.00	10050	26800	0.97	
565	675	6000	100.00	10125	27000	0.97	
567	680	6000	100.00	10200	27200	0.97	
569	685	6000	100.00	10275	27400	0.97	
571	690	6000	100.00	10350	27600	0.97	
573	695	6000	100.00	10425	27800	0.97	
575	700	6000	100.00	10500	28000	0.97	
577	705	6000	100.00	10575	28200	0.97	
579	710	6000	100.00	10650	28400	0.97	
581	715	6000	100.00	10725	28600	0.97	
583	720	6000	100.00	10800	28800	0.97	
585	725	6000	100.00	10875	29000	0.97	
587	730	6000	100.00	10950	29200	0.97	
589	735	6000	100.00	11025	29400	0.97	
591	740	6000	100.00	11100	29600	0.97	
593	745	6000	100.00	11175	29800	0.97	
595	750	6000	100.00	11250	30000	0.97	
597	755	6000	100.00	11325	30200	0.97	
599	760	6000	100.00	11400	30400	0.97	
601	765	6000	100.00	11475	30600	0.97	
603	770	6000	100.00	11550	30800	0.97	
605	775	6000	100.00	11625	31000	0.97	
607	780	6000	100.00	11700	31200	0.97	
609	785	6000	100.00	11775	31400	0.97	
611	790	6000	100.00	11850	31600	0.97	
613	795	6000	100.00	11925	31800	0.97	
615	800	6000	100.00	12000	32000	0.97	
617	805	6000	100.00	12075	32200	0.97	
619	810	6000	100.00	12150	32400	0.97	
621	815	6000	100.00	12225	32600	0.97	
623	820	6000	100.00	12300	32800	0.97	
625	825	6000	100.00	12375	33000	0.97	
627	830	6000	100.00	12450	33200	0.97	
629	835	6000	100.00	12525	33400	0.97	
631	840	6000	100.00	12600	33		





